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Ventilation and the Dust Hazard

Now that the blackout is past history, the time is opportune for foundry executives to turn their attention to permanent lighting and ventilation. With this in mind we have been browsing over the latest American literature on the latter subject to ascertain current trends in overseas practice. It should be borne in mind that the laws governing industrial hygiene are the affairs of each individual State and not applicable to the whole country. Thus the State of New York has, through the Department of Labor, imposed a requirement " that the amount of dust in the breathing zone of an employee shall not exceed 30 million particles per cubic foot of air in any foundry operation except that in abrasive cleaning rooms, concentration shall not exceed 10 million particles per cubic foot, assuming, of course, that such concentrations apply inside the fresh-air-supplied helmet or respirator that is worn by the operator." The order goes beyond this and provides a number of engineering rules for the control and elimination of dust at its source of generation. The outcome has been that the two requirements are not compatible and many New York foundries now refuse to adopt the codes imposed and are demanding that the factory inspection division of the State prove that they are exceeding the 30 million count. Generally speaking, it is the policy of the American Foundrymen's Association to place no reliance on dust counting at this stage in the development of the science. This is important because the Association through its Industrial Hygiene Codes Committee, being nation-wide in constitution, is regarded as the guiding authority for the various States in this matter.

Another matter, voiced by Mr. John M. Kane, is the tackling of the problem of dust generated by electric steel melting furnaces. Though there are no indications that this is toxic, being largely a mixture of lime and iron oxide, he decided to attempt to eliminate it, if only for the sake of better vision for the crane driver. With a combination of ducts and a hood situated at the cardinal points, whilst still taking care of accessibility, and rapidity of removal for slagging and pouring, a successful system has been devised. Mr. J. W. Fehnel has made an interesting study of electric furnace fumes, and from it we learn that the amorphous silica produced does not set up silicosis, but it may be harmful in some other direction under prolonged exposure to heavy concentrations. Manganese fume, however, is said to be highly toxic, whilst chromium is deemed to be inert. Though little is known of many steel-making elements, vanadium fume is considered to be dangerous.

Looking at the subject by and large, it is obvious that dust of any type is undesirable. Its elimination is an engineering project, not half so difficult of solution as many which have been successfully tackled during this last war. Much has been accomplished; for instance, the dust concentration around a battery of well-ventilated grinders was of the order of 1.8 million particles per cubic foot as against 3.7 million for the average city streets. The opinion is expressed by Mr. Warren A. Cook that " whether or not grinding operations, where the quartz percentage of the dust is low total dust does not exceed five or ten million particles per cubic foot, actually causes injury to the lungs would seem to be exceedingly improbable on the basis of present information. Chest X-rays have shown some markings which simulate silicosis. There is a real possibility that these markings may be due to iron or iron oxide dust and analogous to the harmless condition of welders' lungs resulting from iron oxide fume, may have no significance as far as injury to health is concerned."

Post Scriptum.—The fumes from tellerium are not toxic, but anti-social, inasmuch as they communicate to the breath an odour so pungent as to warrant the diffuser exclusion from all civilised communities, except perhaps the porters' room at the Gare du Midi.

Contents

Ventilation and the Dust Hazard, 65.—Institute of British Foundrymen, 66.—Correspondence, 66.—New Catalogue, 66.—Thermal Lag in Heat-Treatment Operations, with Particular Reference to the Annealing of Malleable Cast Iron, 67.—New Trade Marks, 72.—Notes from the Branches, 72.—Raw Material in Post-War Planning, 73.—Costs in a Jobbing Foundry, 75.—New Patents, 76.—The Technical Press, 77.—Institute Elects New Members, 78.—New Trade Marks, 79.—News in Brief, 80.—Company Results, 82.—Cost of Workmen's Compensation, 82.—Personal, 82.—New Companies, 84.—Obituary, 84.—Raw Material Markets, 86.

INSTITUTE OF BRITISH FOUNDRYMEN

ANNUAL MEETING PROGRAMME

The annual meeting of the Institute of British Foundrymen will be held at the Waldorf Hotel, Aldwych, London, W.C.2, on Friday and Saturday, June 15 and 16, 1945.

The proceedings on Friday will commence at 6.45 p.m. with a dinner, to be followed by a meeting at 7.45 p.m., when the following Papers will be presented and discussed:—"Initial Experience in Hydraulic Cleaning in a Steelfoundry Fettling Shop," by F. N. LLOYD; "Preliminary Study of Metal Pouring by Cine Radiography," by S. L. FRY; "An Investigation of the Constitution of Certain Foundry Bonding Clays," by R. W. GRIMSHAW, B.Sc., and A. L. ROBERTS, Ph.D.

On Saturday, the annual general meeting will be held at 9.30 a.m., followed at 11.15 a.m. by the Edward Williams' Lecture: "The Future of the Light Metal Foundry Industry," by COL. W. C. DEVEREUX, F.R.Ae.S., M.I.A.E. At 2.15 p.m., after the luncheon interval, the following Papers will be presented and discussed:—"The Cause and Control of Microporosity in Magnesium Alloys," by E. A. G. LIDDIARD, M.Sc., and W. A. BAKER, B.Sc.; "The Production of Whiteheart Malleable Iron by Annealing in Partially Burnt Town's Gas," by I. JENKINS, M.Sc., and S. V. WILLIAMS, B.Sc.; "The Annealing of Whiteheart Malleable Iron by a Gaseous Process," by A. G. ROBIETTE, B.Sc.; "A New Method of Investigating the Behaviour of Charge Materials in an Ironfoundry Cupola and Some Results Obtained," by N. E. RAMBUSH and G. B. TAYLOR; "Tentative Recommended Methods for Casting Cast-iron Test-bars," by Sub-Committee T.S.4 of the Technical Council; "A Study of Moulding Methods for Sound Castings," by F. SEFING (American Foundrymen's Association Exchange Paper); and "Gating and Feeding of Steel Castings," by S. T. JAZWINSKI, E. D. WELLS and S. L. FINCH.

A METALLOGRAPHIC POLISHING CREAM specially suitable for ferrous micro-sections, which has been developed in the laboratories of the British Cast Iron Research Association, is now being made and distributed through Cooke, Troughton & Sims, Limited, of York.

As from to-morrow, May 25, all communications for THE FOUNDRY TRADE JOURNAL should be addressed: 49, Wellington Street, Strand, London, W.C.2. Telephone: Temple Bar 3951 (private branch exchange). Telegrams: Zacatecas, Rand, London.

CORRESPONDENCE

[We accept no responsibility for the statements made or the opinions expressed by our correspondents.

REMOVAL OF LIGHTING RESTRICTIONS

To the Editor of THE FOUNDRY TRADE JOURNAL.

SIR,—I have been officially informed that all lighting restrictions, including those on glare, have now been removed throughout the country. Previous relaxations, made in February last, allowed industrial establishments in the major part of the country to show light and glare during darkness hours subject to an exemption being obtained from a Chief Constable, and ironfoundries situated where relaxations could be made were advised by circular letter.

Now that all restrictions have been removed work on any uncompleted anti-glare schemes should be discontinued, while the condition upon which Government grant has been paid towards the cost of such schemes (*i.e.*, that the materials will be maintained in good and serviceable condition and kept available for the purpose of the specified measures) is now waived.

Yours, etc.,

J. G. PEARCE.
Chairman,
Ironfounding Industry Anti-Glare Committee.
British Cast Iron Research Association,
Alvechurch,
Birmingham.
May 14, 1945.

NEW CATALOGUE

Castings. We have received from the Standard Brass, Iron & Steel Foundries, Limited, of Main Reef Road, Benoni, Transvaal, a 32-page well-illustrated brochure. It is a high grade publication, and few superior have emanated from the British or Dominion foundry industry. The foreward relates how Mr. Arthur Moore (who was originally trained under Mr. C. E. Williams, of Cardiff) and Mr. Fred Hobbs, possessing no capital, no raw materials, and no plant, started business as foundry owners in 1913, and how with "Heath Robinson equipment" they successfully cast a bronze pump body weighing 4½ tons, which is still in commission and so established themselves. The business has grown very extensively, and now includes both iron and steel foundries. The original partners are still active in the management of the concern, and only recently they have rebuilt the brass foundry, so that now it has a normal annual production of over 6,000 tons. A centrifugal casting department is included. Though the foundry must be about 1,000 miles from the coast, it is making 5-ton bronze propellers. The works laboratory is well equipped, but apparently it still lacks X-ray plant, and spectroscopic apparatus. This fact should provide a good excuse for the partners to visit the U.K. in the near future and so renew old friendships. Good use has been made of two-colour printing, especially for illustrating the bronze castings, to which subject the main section of the brochure is devoted. The final pages are taken up with the presentation of technical data.

THERMAL LAG IN HEAT-TREATMENT OPERATIONS, WITH PARTICULAR REFERENCE TO THE ANNEALING OF MALLEABLE CAST IRON*

A factor which is not usually given sufficient consideration

By A. E. PEACE

Most malleable cast-iron manufacturers have at some time encountered the peculiarity of well-annealed and under-annealed castings coming from the same pot in the annealing oven. In such cases, when the castings have been proved to be of similar composition as cast and no differences in treatment have been apparent, it has been usual to dismiss the matter as a freakish occurrence. However, there is one factor which is rarely given proper consideration and the magnitude of its effects are not fully appreciated. This factor is thermal lag.

Reference has been made to malleable cast iron, because the changes taking place in the annealing process are very sensitive to time and temperature, and also the general practice of annealing the castings with a packing material in boxes increases the thermal lag. So it is that malleable annealing readily evidences the effects of thermal lag. However, the heat-treatment of cast iron, steel and non-ferrous metals is also susceptible in varying degrees. It is necessary to give some consideration to the ways in which heat is transmitted.

Heat Transfer

Heat is always transmitted from a hotter body to a cooler one and may take place in any one, or combination, of three ways, namely, conduction, convection and radiation.

Conduction is the only way in which heat is transferred through a solid.† The process involves continuity of matter and contact between the bodies losing and gaining heat. Conduction also takes place in liquids and gases, but, as will be seen later, other factors reduce the importance of conduction in fluids. The quantity of heat conducted through a body in a given time varies directly with the temperature difference between the hot and cold parts, with the surface area normal to the direction of flow and inversely with the length. Of greatest interest to us is the variation due to the nature of the materials involved. It is generally well known that metals are good conductors of heat and non-metals are poor, although the relative efficiency is not readily understood.

In Table I are given thermal conductivity data for metals. The figures are expressed in C.G.S. units, *i.e.*, gm. cals./cm.²/sec./deg. C./cm. The data have been obtained from various sources, but most of our information concerning commercial metals is due to Dr. Donaldson.[1 2 3] It will be seen that the conductivity of pure metals is superior to that of alloys, and, in fact, commercial metals are not nearly such good conductors of heat as is generally supposed. There is some slight variation with temperature. The thermal conductivity of pure metals decreases with rise in temperature, but increases in the case of non-ferrous alloys. Irons and steels show a decrease. The data[3] for the metallographic structural constituents in iron and steel are interesting and one may deduce from this that the conductivity of malleable cast iron is very low in the early stages of annealing, but increases as graphitisation and decarburisation progresses. Table I also shows data for some typical non-metallic solids. It will be seen that such materials have much poorer conductivity than metals, a rough relation being from 1/100th to 1/200th.

TABLE I.—*Thermal Conductivity of Metals, Non-Metallic Solids and Gases. (Data in C.G.S. Units at Around Atmospheric Temperatures.)*

Metals.			
Pure copper	0.918	Cast irons ...	0.094/0.135
Pure aluminium ...	0.504	Blackheart m.c.i.	0.150
Pure iron	0.161	Whiteheart m.c.i.	0.115
Brasses	0.204/0.260	Ferrite	0.174
Bronzes	0.102/0.189	Pearlite	0.124
Aluminium alloys ...	0.300/0.370	Cementite ...	0.017
Steels	0.117/0.160	Graphite ...	0.057

Non-Metallic Solids.		Gases	
Insulating brick ...	0.0003	Air	0.000057
Refractory insulating brick	0.0006	Nitrogen	0.000052
Sand	0.0009	Oxygen	0.000056
Firebrick	0.0016	Carbon monoxide ...	0.000050
Silica brick	0.0019	Carbon dioxide ...	0.000031
Glass	0.0017	Water vapour ...	0.000053
Silica	0.0024	Methane	0.000065
Granite	0.0015	Hydrogen	0.000327

Data for gases show that they are even poorer conductors than non-metallic solids. Variations in the composition of flue gases and in the controlled atmospheres likely to be used in commercial heat-treatment will not materially affect the thermal conductivity, since the quantity of nitrogen and the CO and CO_2 ratios will be the controlling factors.

Convection

In liquids and gases, differences in temperatures cause differences in density. As is well known, a light fluid

* A Paper presented to the Birmingham Branch of the Institute of British Foundrymen, Mr. G. R. Shotton presiding.

† This statement ignores rare instances of solids which are appreciably transparent to heat radiation.

Thermal Lag in Heat-treatment Operations

rises and a heavier one falls. Differential temperatures therefore cause motion in fluids, and this flow or natural convection is an important method of heat transfer. Flow can be increased mechanically by means of a fan, and this is referred to as forced convection. In forced convection, the pressures are generally sufficiently high and the motion rapid enough to make the effect of natural convection currents negligible by comparison. Chimney draught and forced draught firing produce convection currents which may be of more importance in distributing heat than natural convection. The heat transmitted by convection varies with the difference in temperature and the velocity of the fluid.

Radiation

Hot bodies radiate heat, the amount varying with the nature of the material, and rises rapidly with increase in temperature. In conduction and convection, the quantity of heat transferred depends upon temperature

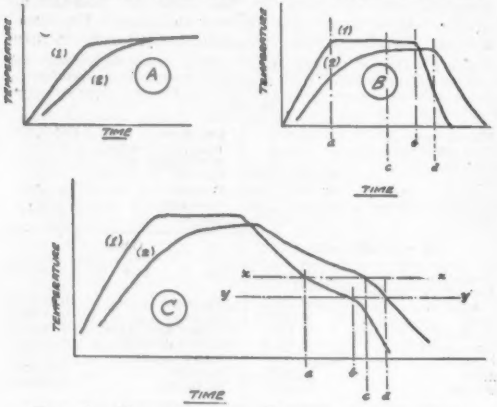

FIG. 1.—DIAGRAMMATIC CURVES ILLUSTRATING THERMAL LAG.

differences, whereas in radiation it depends upon the fourth power of the differential absolute temperatures, so that at low temperatures conduction and convection are more important, but at high temperatures, radiation is the major factor.

In thermal radiation, one has to consider emission, absorption and reflection. Materials have varying degrees of opacity and of surface reflection. A completely opaque and non-reflecting material, referred to as a brick body, radiates heat at the maximum rate possible for any given temperature and wavelength. Bodies radiate in proportion to their ability to absorb, so that strong radiators are strong absorbers.

The solid materials which interest founders are all opaque and strong absorbers and generally poor reflectors of radiation. Refractories have emissivities of 0.75 to 0.90 (black body = 1.00). Iron and steel have somewhat similar emissivities unless the surfaces are polished when the emissivity is considerably reduced. When oxidised the coefficient reaches very closely to black body conditions. Generally non-ferrous metals have poor emissivities, and even when oxidised are lower than iron and steel. In a closed oven there are practically black body conditions because radiation not at first absorbed, is reflected backwards and forwards until absorption is complete.

Gases are poor radiators, and only carbon-dioxide and water vapour contribute appreciably to radiation from non-luminous gas. Luminosity in gases is due to suspended particles of unburnt carbon, and these emit as solids following the fourth power law and greatly increase the radiation.

Heat transfer, which is capable of considerable mathematical treatment has been the subject of much experimental investigation, and a selected bibliography is appended[4 5 6]. Attention is particularly drawn to a book recently prepared by the Education Sub-Committee of the Fuel Efficiency Committee of the Ministry of Fuel and Power.[7] This work treats the subject in an eminently practical manner.

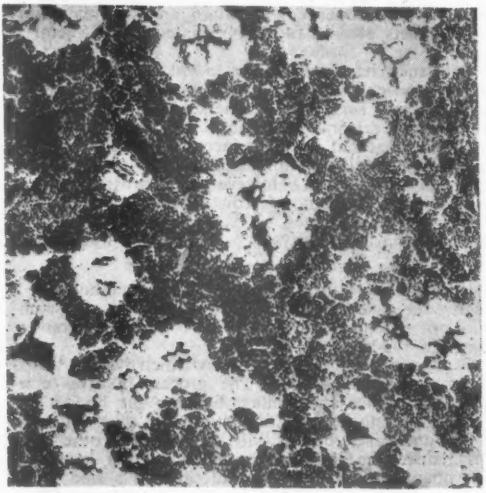

FIG. 2.—PHOTOMICROGRAPH, BLACKHEART MALLEABLE CAST IRON, ILLUSTRATING INCOMPLETE GRAPHITISATION DUE TO RAPID COOLING THROUGH THE CRITICAL RANGE. ETCHED WITH PICRIC ACID. × 100.

Heat Capacity

Another factor of considerable importance in heat transfer is the heat capacity of the various materials. Table II gives the specific heat of some metals and non-metallic solids. It will be seen that the latter require

approximately twice the amount of heat than metals to raise equal weights to equivalent temperatures. However, when considering heat-treatment in boxes, with a packing material, for example, pack hardening or malleable annealing, it is necessary to treat the matter in terms of relative volumes occupied. This introduces apparent densities which in the case of packing materials vary with the screen size. Hematite ore of 70 kibble has an apparent density of 2 to 3 and spent annealing ore of similar grading, 1¼ to 2. As the specific gravity of iron is about 7.5, it is readily calculated that the heat capacities of ore and metal occupying equal volumes are in the ratio of about 1:2. With greater fineness of the ore, the apparent density increases and the ratios become more nearly equivalent.

Thermal Lag

Thermal lag in heat-treatment must be understood to cover not only:—(1) Delay in reaching a desired temperature or a supposed temperature, but (2) inability to reach a desired temperature within a prescribed time;

TABLE II.—*Specific Heat of Metals and Non-Metallic Solids. (Cal./gm./deg. C. Range, 0-100 deg. C.)*

Metals.		Non-Metallic Solids.	
Brass	0.092	Ferric oxide ...	0.160
Bronze	0.086	Magnetic oxide ...	0.159
Steel	0.110/0.117	Blast-furnace slag	0.204
Cast iron	0.119/0.131	Firebrick	0.196
Malleable cast iron ...	0.116/0.122	Granite	0.192

TABLE III.—*Relation of Surface Area to Volume of Malleable Annealing Pots. (Constant volume of 10 cub. ft., constant height of 4 ft.)*

Shape.	Cross-section.	Surface Area.
	In.	Sq. ft.
Round	21¼ dia.	25.0
Square	19×19	27.8
Rectangular	30×12	30.5
Rectangular	45× 8	37.8

(3) inability to realise the desired holding time at the desired temperature; and (4) delayed rate of cooling.

Diagrammatic curves in Fig. 1 illustrate various effects of thermal lag. In diagram "A" it may be assumed that curve (1) is the temperature of the furnace atmosphere, and curve (2) the temperature in the centre of the working load. In this example the lag is such that the work reaches the required temperature an appreciable time after the furnace pyrometer indicates that the heat-treatment temperature has been attained.

In diagram "B," the time allowed for the operation has not been long enough for the work to reach the required temperature. The effect of lag in producing a shorter time at the maximum temperature is illustrated by the relation of the time intervals *ab* and *cd*. This effect is not invariable, being dependent on the heating and cooling rates. For example, a very slow cooling rate increases the lag and frequently results in a lengthened time at the maximum temperature. The slower cooling rate due to lag is also illustrated.

Diagram "C" represents a possible happening in the annealing of blackheart malleable cast iron. In this case it may be assumed that curve (1) records the temperature within a pot at the front of the oven, and curve (2) the temperature within a pot nearer to the centre. The curves of the heating, holding and early cooling periods are similar to those shown in diagram "B." The lines *xx* and *yy* intercepting the cooling curves, represent the critical range. It will be seen that curve (1) tends to flatten out on entering the range, due to the exothermic reactions in the metal associated with the pearlite change point. After passing through the range, the annealing reactions are completed and accelerated cooling is permissible. In this example it is assumed that the oven doors are removed and curve (1) shows the resultant faster cooling. The pot recorded by curve (2) would also cool faster as indicated, but due to lag, the temperature has not entered the critical range when the change in cooling rate takes place. There is therefore a rapid passage through the range, the time being represented by *cd* as compared with the longer interval *ab* for curve (1). This reduced time

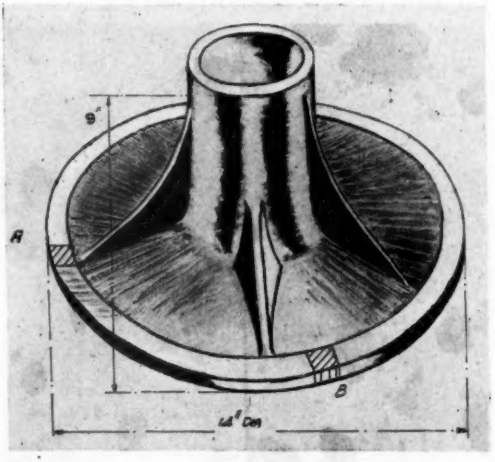

FIG. 3.—SKETCH OF AXLE CASE, SHOWING DIMENSIONS AND POSITION OF SPECIMENS.

through the range would prevent complete graphitisation of the pearlite. The structure of metal so produced would be similar to that shown in Fig. 2, the physical properties of which are characterised by greyish fractures, poorer ductility and greater hardness.

Practical Examples

Two examples of the effect of thermal lag upon the quality of the product are now given. The first case is that of a blackheart malleable casting. The component is an axle case weighing approximately 31 lbs., with general sections of $\frac{5}{16}$ in. and a flange

Thermal Lag in Heat-treatment Operations

section of ¼ in. A sketch of the casting is shown in Fig. 3. The part was packed flange down in a box approximately 22 in. by 22 in., with an inert packing material and in a batch-type oven with a cycle of approximately 50 hrs. at 800 to 820 deg. C. After annealing, examination of a specimen from position "A" showed a well-annealed blackheart structure, but that from position "B" showed incomplete annealing. The structures are illustrated in the photomicrographs in Fig. 4. The one on the left (position "A") is composed of temper carbon in a ferrite matrix, the normal structure of good blackheart, while the one on the right (position "B"), although possessing a ferrite matrix, contains appreciable cementite ungraphitised from the original hard iron. The incompleteness of graphitisation of specimen "B" is the result of insufficient time at a high enough temperature. This was due to position "B" being further away than "A" from the source of heat, *i.e.*, the outside of the pot, most of the heat arriving at "B" having to proceed by conduction through the metal from "A." Further, as heat flows from "A" towards "B," the intrinsic rate of the metal conductivity is reduced by losses to the packing material *en route*, and also by convection and radiation from the base of the casting and the intervening ribs.

The next example is of a small cast-iron detail. The casting is very light and is a hollow cylinder, ¾ in. outside diameter with $\frac{3}{16}$-in. wall thickness. As cast, the metal is mottled and is subjected to annealing at 830 deg. C. for 1 hr. The castings are packed in trays without packing material. The trays are approximately 9 in. deep, 12 in. wide and 4 ft. long. They are placed lengthwise across a gas-fired continuous oven and the cycle is 2½ hrs. to reach to 830 deg. C., 1 hr. at 830 deg. C., and 4½ hrs. cooling. The normal result of such treatment is a completely ferritic matrix.

The example illustrated in Fig. 5 shows that the original carbide structure was only slightly broken down, due to insufficient time at an adequate temperature. The working load in this instance receives its heat chiefly by radiation from the furnace crown. This is absorbed by the exposed castings on the top of the trays and then transmitted downwards through the load by alternate conduction through the radiation between the castings. In cases like this, further lag can be caused by sand from the castings and cores being dislodged from the upper layers and falling amongst the lower layers of castings. Some heat is also transferred to the bottom of the trays by radiation from the furnace hearth and lag may be caused by the hearth not having reached the equilibrium temperature when starting up the furnace after a shut-down.

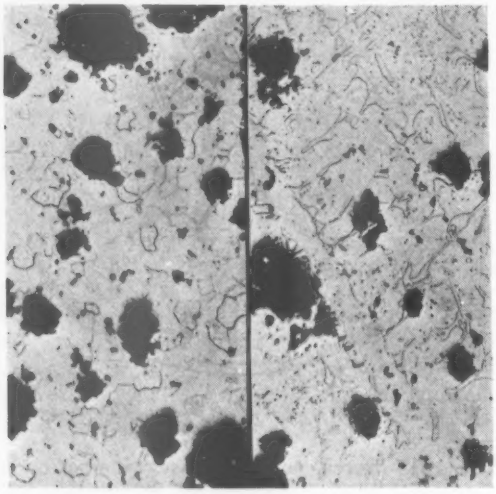

FIG. 4.—PHOTOMICROGRAPHS, BLACKHEART MALLEABLE CAST IRON. "A" (LEFT) SHOWING WELL-ANNEALED STRUCTURE. "B" (RIGHT) SHOWING INCOMPLETE GRAPHITISATION. "A" ETCHED WITH NITRIC ACID. "B" DOUBLE ETCHED WITH NITRIC AND PICRIC ACIDS. BOTH × 100.

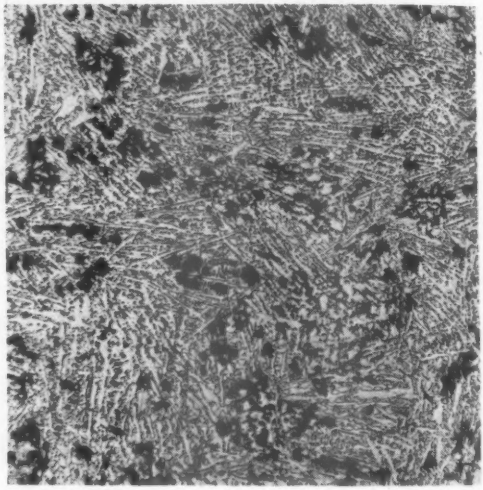

FIG. 5.—PHOTOMICROGRAPH, GREY CAST IRON, SHOWING UNSATISFACTORY ANNEALING. DOUBLE ETCHED WITH NITRIC AND PICRIC ACIDS. × 100.

Returning to malleable annealing, Fig. 6, taken from a Paper by Bean and Jaeschke,[5] shows the lag effect due to the use of pots and packing material. The pots without packing material lag about 10 hrs. behind the oven atmosphere and the pots with packing show a lag of over 20 hrs., and do not reach the maximum temperature by 25 deg. C.

Fig. 7 shows another example of lag in a malleable annealing oven. Curve "A" is the record from the centre of a square pot, of dimensions approximately 22 in. by 22 in. with an inert packing material. Curve "B" shows the temperature at the centre of a round pot, 6 ft. dia., with packing material, annealed in the same oven. In this case, the lag is tremendous, the centre of the large diameter pot showing a lag of 100 hrs. and a lag in maximum temperature of 100 deg. C.

Shape and Size of Annealing Pots

When work is heat-treated in pots, the outside of the containers first absorb the heat by radiation and convection before conducting to the inner side and

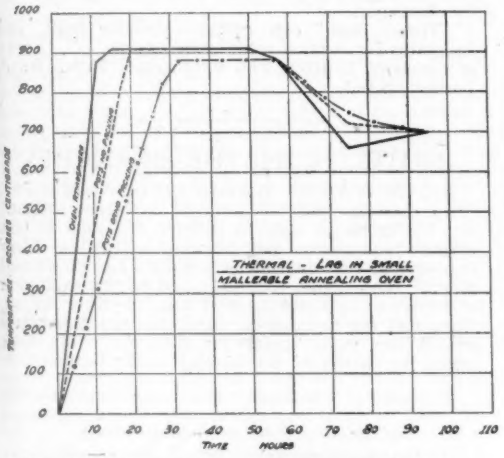

FIG. 6.—CURVES ILLUSTRATING THERMAL LAG IN A SMALL MALLEABLE ANNEALING OVEN.

then transmitting the heat to the work. The efficiency of absorbing heat must therefore vary with the ratio of surface area exposed to cubic contents of the container.

Table III illustrates the effect upon surface area exposed of various simple shapes. The data have been calculated for what might be typical dimensions of volume and height of pots used in malleable annealing. The effectiveness of the top and bottom surfaces of the pots has been rated at 50 per cent. of the areas, because the tops are usually heavily lagged and the bottoms are but poorly exposed to convection and radiation. A volume of 10 cub. ft. with a height of 4 ft. has been taken and the magnitude of the variation in surface area for these governing dimensions is seen. Obviously a round pot is least efficient and a rectangular shape with the maximum ratio between width and breadth is the most efficient.

There are, of course, factors which may preclude the use of the more efficient shapes, *e.g.*, limitations imposed by the size and shape of the castings and features which affect the production of a good-quality pot. There is also an advantage attaching to the use of round pots in that they present better clearances for convection currents in the oven. Apart from the effect of surface area in relation to volume, there is the additional factor of maximum distance from the source of heat, which, of course, decreases with the shapes and sizes as the surface area increases.

Types of Heat-treatment Furnaces

It is only proposed to deal briefly with a few types of furnaces. The main effect of furnace type upon thermal lag is due to heat distribution. In the con-

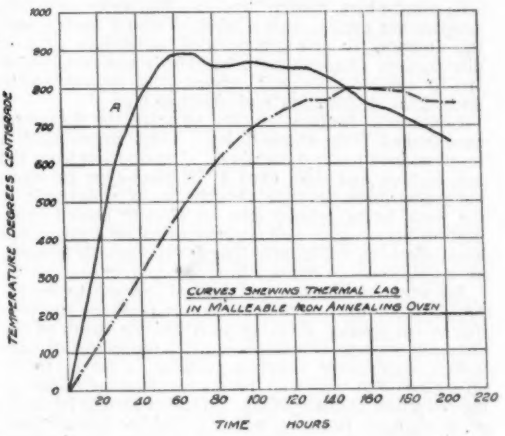

FIG. 7.—CURVES ILLUSTRATING THERMAL LAG IN A MALLEABLE ANNEALING OVEN.

ventional batch-type solid-fuel or gas-fired ovens, the heat distribution is very largely determined by convection; particularly is this so as the size and notably the height increases. The design of the burners, firing ports or fireboxes and the flues are of paramount importance in distributing the hot gases or flame not only around the work, but to the walls, arch and floor, which, gaining heat by convection, then play an active part by radiation. Usually it is difficult to reach all parts of the floor by convection, and there is always extreme lag in heating the floor by radiation. In this type of oven there is, therefore, a tendency to "cold

Thermal Lag in Heat-treatment Operations

spots." Forced-draught firing with good flue design improves the heat distribution.

Where car or bogie hearths are used in this type of furnace, the "cold bottom" effect is somewhat increased by reason of the cooling down of the hearth between heats. Insulation is effective in conserving heat and selectivity is desirable in this respect. The comparatively new refractory insulating bricks offer an opportunity to reduce the heat capacity of the oven structure which would have a beneficial effect on thermal lag.

In batch-type electrically heated furnaces, the heat distribution is essentially by radiation, and it is therefore desirable to work with comparatively shallow loads. Resistance elements enable heating to be provided in the door, which is otherwise a source of considerable heat loss and thermal lag. Elements are usually fitted under a hearth plate and lag in the bottom of the charge can be very largely overcome. Whilst forced convection with recirculation of a suitable atmosphere present practical difficulties with high temperature cycles, such a method would enable electric furnaces to give almost ideal conditions of heat distribution. Radiant tube heating is somewhat similar to electric resistance elements as regards effects upon heat distribution and thermal lag.

Continuous furnaces obviate some of the difficulties encountered from thermal lag. Heat penetration is resolved into lesser dimensions. Distribution from the top, bottom and sides exist as in batch-type furnaces, but penetration through the charge is simplified by the work being pushed into an already heated zone. Bottom heat is also well ensured when the furnace has been operating sufficiently long for the hearth to reach an equilibrium in temperature.

Advances in overcoming thermal lag are to be expected from the use of continuous furnaces irrespective of the method of firing, provided the depth of the charge is kept to a minimum. The utilisation of controlled atmosphere enabling packing in boxes to be dispensed with will also be an outstanding factor in the reduction of thermal lag. Mention should be made of liquid bath furnaces, which are either heated from the outside by gas or from electrical immersion heaters. In either case, the heat distribution is by convection and the effects of lag are very slight. Such furnaces, however, are not suitable for very long cycle heat-treatment, and they also necessitate handling the details individually.

As regards future development, the possibility exists, and the suggestion was made some years ago[6] of induction heating being applied to the commercial homogeneous heat-treatment of castings. This involves individual heating of each component and may result in almost complete elimination of thermal lag.

Acknowledgment

Thanks are due to H. Greatorex and K. Bowd for the provision of the illustrations and to Ley's Mal-

(*Continued at foot of next column.*)

NEW TRADE MARKS

The following applications to register trade marks appear in the "Trade Marks Journal":—

"DELTA"—Chemical substances for use in the industrial treatment of metals. DELTA METAL COMPANY, LIMITED, Tunnel Avenue, East Greenwich, London, S.E.10.

"FOSECO"—Scientific, weighing and checking apparatus. FOUNDRY SERVICES, LIMITED, trading also as W. H. FERRIS & COMPANY, 285, Long Acre, Nechells, Birmingham.

"MAREX" AND DEVICE—Apparatus and appliances for heating, cooling, refrigerating, drying and ventilating. MARSTON EXCELSIOR, LIMITED, Wexham Road, Slough, Bucks.

"RAPIDEEP" — Chemical substances containing cyanide for the heat-treatment of metals. IMPERIAL CHEMICAL INDUSTRIES, LIMITED, Wrexham Road, Slough, Bucks.

"MARDRIVE"—Electric motors (not for land vehicles) and clutches (machinery). MARINE ENGINEERING COMPANY (STOCKPORT), LIMITED, 14, Bulkeley Street, Edgeley, Stockport.

"THREE SEAS" AND DEVICE—Machine tools, and apparatus for internal combustion engines. C. CASPER & COMPANY, LIMITED, 172, Buckingham Palace Road, London, S.W.1.

NOTES FROM THE BRANCHES

SOUTH AFRICAN, NATAL SECTION.—The February meeting took the form of a "Guest Night." Mr. H. Steinhardt was the lecturer and took for his subject "Manganese and Aluminium Bronzes—Their Importance for Marine, Chemical and Industrial Work." The lecture was illustrated by the exhibition of numerous castings carried out in these alloys. These and the question of metal recovery from slags formed the main topics for discussion. Mr. Rice voiced the thanks of the meeting to the lecturer.

(*Continued from previous column.*)

leable Castings Company, Limited, for permission to use some of the data. Thanks are also expressed to Dr. E. R. Walter for his helpful interest.

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RAW MATERIAL IN POST-WAR PLANNING*

By W. G. MOCHRIE

Will ingots maintain their wartime preferential demand over scrap in the more normal times to come? One might well wonder how often this question, direct or implied, has recently been asked the foundryman by merchant and manufacturer (both of whom anticipate a keen competition in certain foundry fields after the war), and whether the foundryman has shared their concern for a preview of their respective prospects and shown any desire to commit himself. His own customers' needs, freedom to choose his own mixtures (it is said that controls will be continued in some spheres for some time after the cessation of hostilities), availability of metals, and, last but not least, the question of comparative prices, are the unknown factors which will decide his line of action, and he may consider that at the moment he can have no personal say in the matter. It is proposed to illustrate how far he can go to formulate his post-war plans with regard to metal purchase, and, in fact, how imperative it is that he should do so.

Naturally, the foundryman's ultimate object in any post-war planning is the survival and success of his own particular business. This must be governed by his ability to meet the demands of his customer. He must also ensure the continued interest of his customer in the product of his own labour—the casting. In effect, his casting must be able to compete with (1) that of his neighbour; (2) the menace of fabrication within the metal trades; and (3) the incursion of other materials, such as plastics, which are certain to encroach upon the metal market. It can readily be understood that in his endeavour to meet competitive quality, even the smallest jobbing foundryman is contributing towards the prestige of the casting industry, so often dubbed the black sheep of the engineering trades, largely by—and certainly because of—the foundry industry itself. Small and large shop alike must not be content to regard present or past standards as the best the foundry industry can produce if the demands on its labour have to be increased or even maintained. To produce any article of the finest quality, the utmost control must be exercised throughout production, and the casting is no exception. It has been argued that the countless number of variables in average foundry production makes 100 per cent. control impossible, but it would be very interesting to find out how many of these variables themselves could be controlled. Undoubtedly every shop has its own difficulties, each of which would have to be thrashed out independently, but one which affects every foundry is that of raw material—the genesis of the casting process.

Melting Virgin Metals

Possibly the least affected in this respect is the foundry whose supply of metal takes the form of virgin ingots. There may be inconsistencies or difficulties in the production of mixtures for the castings, but in the foundry specially equipped for this procedure, the mixing itself is conducted within the foundry and does not come under review. It is unlikely that improvement will be required on present-day virgin metal brands for foundry purposes, but the introduction of War Emergency Standards, calling for the stepping-down of the high-purity alloys and the conservation of virgin metal, has induced many such foundries—foundries in some cases which would not countenance the remelted ingots—to use this so-called "secondary" form of metal, and has given them an opportunity to consider this supply as an alternative post-war raw material. In this respect they are similarly placed to the majority of foundries who have previously found their supplies in form other than virgin ingot, but there is no reason for their supply being any the less consistent.

Scrap Metal

For generations scrap has been the main source of metal supply—and in some cases the only one—in the foundry engaged on the "commercial" type of work. It provided a cheap raw material, adequately reliable in spite of the various mixtures that could be incorporated under any scrap description. Apart from the merchant's advised grade, quality could be checked, usually by the operator at the furnaces. Rejections with regard to quality, when made, usually took the form of iron and other foreign ingredients.

Utilisation of Ingots

The ingot, on the other hand, in many foundries prior to the war, was a comparative newcomer, and as such was under suspicion from the first. There was no doubt in the mind of the foundryman that this was the product of remelted scrap—a scrap he could not see for himself as he did his own. Whereas he knew what he was using in charging scrap into his pots, he did not know what manner of evil he might be employing in the form of ingot. He may have unconsciously regarded it as a casting on which he must have taken a poor view. Had it been included in a parcel of scrap it would have been promptly rejected, on account of doubtful colour and origin. Even in one batch the colour of the ingots varied considerably, but wartime conditions have made most, if not all, foundries ingot-conscious, and it has been found that like the sausage—but with perhaps more pleasant repercussions—the colour of the skin gave no indication as to what was contained within. Prices, too, favoured scrap, which in many cases tipped the balance in favour of this form of supply. Taking all these points into consideration, one can readily understand the hesitation of the foundryman in introducing secondary ingots as his form of regular supply, which, with the doubtful "qualities" of some suppliers, accounts for the tardy progress of the ingot as a substitute for scrap in commercial work.

However, the effect of wartime activities on the future scrap market, and the contribution the foundryman himself is making, is worth considering. Conservation of metals in short supply and the unpre-

* An entry for a Short Paper Competition organised by the London Branch of the Institute of British Foundrymen.

Raw Material in Post-war Planning

cedented demands for high-duty alloys, have introduced many new compositions into the average foundry, where to-day's routine mixtures bear no relationship to pre-war metals. These mixtures will come back sooner or later as scrap to the foundryman choosing scrap as his form of supply.

Influence of Current Practice on Future Supply

The scrap sorter's best guide as to the suitability of, say, brass for the foundry bin, is the article's castable shape and colour, but would the foundryman himself like to say whether his aluminium-bronze casting, machined and freed of its cast skin and exposed to air, oil and dirt, would be quite discernible from his manganese-bronze casting similarly treated, or from any scrap at present in his brass bin? Consider the mixtures of these three alloys: Cu-Zn, with its standard brass technique in the foundry; Cu-Al-Fe (and possibly Ni and Mn), with its standard but entirely different procedure, and Cu-Zn-Fe-Mn-Al, with again an entirely different casting technique. It would be impossible to lay down hard and fast casting rules to guard against the dangers of contamination and resultant mis-runs, draws and hot-shorts. Again, hot-stamping scrap has a casting shape, and may pass as foundry brass, but when introduced into a pot of brass, on account of low Cu-content, does not " accommodate " the normal impurities present in everyday brass mixtures and results in casting difficulties.

Gunmetal practice is less likely to suffer from the point of view of normal impurities, but with the high-Zn, low-Sn alloys most prevalent in commercial supplies, manganese-bronze, silicon-brass or hot-stamping scrap even in small quantities, has a very harmful effect, and is likely to make standard practice look silly. In the case of phosphor-bronze, more Pb-, Zn- and Si-containing mixtures are likely to pass into this scrap than previously. For instance, the leaded phosphor-bronze in everyday use at the moment and silicon bronze have certain resemblances in skin, colour and fracture to the high-Sn, high-Pa, Pb-free alloys, but what a range in foundry techniques would be required to accommodate variety in proportions!

Light Alloys

With regard to the light alloys, it may not be the lot of every foundryman to produce castings in Mg-base alloys, but it is generally known that this type of mixture has been in great demand in recent years. Unless some means—less expensive than the spot-testing of every piece—are advised in the sorting of Mg-base from Al-base scrap, there will be much confusion in light alloy foundry practice. This may be an extreme case, but the most prevalent inconsistencies will be more likely to follow from contamination of the aluminium alloys themselves. Colour, weight and shape will not give any indication as to whether scrap is Al-Zn-Cu (L/5), Al-Si (L/33), or Al-Si-Cu (DTD 424), each of which possesses different casting techniques. To these must be added the certain contamination of fabricated light alloy parts devoid of all castability. Heat-treatment, grain-refining agents, conditions of crystal growth and arrest, each contribute towards the denial of the fracture as a means of segregation.

It should therefore require but little imagination to visualise the effect of future scrap on the cost per lb. of casting, without even considering that casting as a criterion of the foundry industry in the engineering field. If the raw material is to be controlled, as it must if production costs have to be kept at a minimum, one must look to ingots, but just how far the ingot will fulfil the conditions required depends entirely on the foundryman. If the only advantage it can offer is its convenient shape and size, it might just as well be done without from the point of view of quality.

It is suggested that ingots should be ordered against a British Standard Specification (there is one for every need). The minimum mechanical tests appended to these specifications should be the criteria of quality in conjunction with the chemical analysis. Tensile tests could be carried out without having recourse to re-melting the ingots—manufacturers are invariably jealous of the treatment of their products in the foundry! To this end, tensometer pieces at least should be cut from the ingots themselves. It may be argued that ingots are of doubtful soundness, and provide no guarantee that any bar taken therefrom will be sound in itself. It has been found, however, that one common cause of faulty castings which is not yet fully realised is certain gases be occluded from the solidifying ingot, trapped and contained within the " blows " of the ingot. These obviously are not revealed in chemical analysis, but by insisting on a sound ingot—sound enough for a tensometer piece to be cut out—one potential danger is being eliminated.

It may be interesting to note that this practice has already been put into operation, and making for fuller control in the foundry, it appears to be stimulating aspirations for greater exactitude in the production of the foundry raw material.

THE NINE INDIAN INDUSTRIALISTS who are visiting this country as private individuals and not as an official mission, wish, it is understood, to discuss with British industrialists how far the United Kingdom can supply capital equipment and otherwise assist them in their plans for post-war industrial expansion in India. Amongst the industrialists, who will be accompanied by a number of technical advisers and are expected to remain here about two months before going on to the United States, are Mr. A. D. Shroff, director of several companies in the Tata group, a committee member of the Federation of the Indian Chambers of Commerce and industry, and a well-known financial expert; Mr. Ajaib Singh, who has interests in the Indian wire industry and the iron and steel industry; and Mr. J. R. D. Tata, chairman of the Tata group, and a director of the Imperial Bank of India and other companies.

COSTS IN A JOBBING FOUNDRY

DIVIDING PRODUCTIVE AND UNPRODUCTIVE LABOUR

Discussion on a Paper by Mr. H. E. E. Holladay, B.Sc., presented to the Birmingham, Coventry and West Midlands branch of the Institute of British Foundrymen. The Paper was printed in our issue of May 10.

A vote of thanks having been accorded to Mr. Holladay, on the proposition of Mr. L. W. Bolton, seconded by Mr. A. G. Harrison, the PRESIDENT (Mr. G. R. Shotton) said the major point on which he took exception to the lecturer's system was in his method of dividing productive and unproductive labour. Personally, he would prefer to see the overhead charge in respect of unproductive labour attributed to the moulding cost direct, and core-making attributed, as a direct cost, but not used as a basis for the imposition of the other indirect charges.

MR. HOLLADAY, in reply, explained that the costing system had been evolved for a foundry where there was not a great deal of core-making. They came to the conclusion that to split the core-making costs as a separate item was not really justified. In their foundry the moulder, in many instances, made his own cores. Where a foundry had a core-making department in which a number of people did nothing but make cores, he thought that the chairman's suggestion that they should be a direct charge was sound; they should be treated as almost a separate department in the same way as the patternmaking department.

Runners and Risers as Permanent Stock

Answering Mr. Harrison, the LECTURER said the runners and risers coming back each day, or each week, did not vary very much in total weight. They found that they got back about 25 cwts. every day. They preferred to regard that as a permanent part of their foundry stock, a sort of floating stock which was always in the foundry, and they charged out on the sheet the actual amount of new materials brought into the foundry during the period to produce the castings. Probably, this was not strictly accurate, but, for their purposes, they felt that the greater accuracy produced by weighing back all scrapped castings, etc., did not alter the costs very materially and that really it was not worth doing. Probably, in larger foundries, it would be necessary to charge these in as materials used and credit them back again at the end of the period as being in stock.

Dealing with another question, Mr. Holladay said they charged to the job card the moulding and core-making time. They also recorded, from time sheets made up by the foreman, the total unproductive time for the week for all the men. They then consulted the wages book. Say the wages bill was £150 and the unproductive time £50. They subtracted the £50, which meant that the productive time was £100. They therefore said that the percentage was 50.

Under-foreman as Time Recorders

MR. N. C. BLYTHE asked for a description of the time card. Did he put it down on a piece of paper and add it up at the end of the day? Furthermore, were there any piece-workers, and, if so, did they make their wages on piece-work and then see how much they could include on day work?

MR. HOLLADAY said they had experimented a great deal on time recording and had come to the conclusion that it was not wise to let the actual worker record his time. Generally speaking, he was not capable of wisely distributing his time. They therefore had ruled sheets of foolscap which were made up by the under-foreman in charge of each section. By that means he thought they got a far fairer distribution of time than by leaving it to the moulders and core-makers. He agreed, however, that this was a debatable point. As to piece-workers, they had a few, though in recent years they had discouraged piece-work. Where they had piece-work, the same procedure was adopted.

MR. J. H. DOLPHIN expressed the view that in foundries where the work was very varied it was most important that the various kinds of work should be segregated and have a different percentage for unproductive labour.

MR. HOLLADAY said Mr. Dolphin's remark about a variation in percentage was perfectly sound. It depended very much on the size of the foundry and whether the figures would stand making the system more complicated, or not. In his own case, they had tried to keep the system as simple as possible. They knew that it was not dead accurate, but what system was?

Non-ferrous Costing

MR. F. HUDSON said he would welcome some expansion of the lecturer's remark regarding non-ferrous foundries. It seemed to him that the system explained did not give the cost of the individual casting.

MR. HOLLADAY replied that he was rather steering clear of non-ferrous foundries. The brassfoundry with which he was associated was not a very large one, and it had been operated on somewhat similar lines to the ironfoundry. But they tried to work out their material costs for each particular alloy. They had gas-fired furnaces for melting, and had established accurate figures for consumption. The weight of ingots and returned scrap, or ordinary scrap, used in each alloy was recorded. They then put in the weight of castings made and credited the amount of scrap returned, runners, risers, headers, etc. This gave the value of the materials used, which was then spread, plus the melting cost, on a per lb. basis.

MR. HUDSON asked whether the lecturer could definitely ascertain the cost of each casting, and, when quoting, who estimates the number and weight of runners and risers on each casting?

MR. HOLLADAY repeated that they were only a small firm and said the people who were making up the estimates usually had a pretty shrewd idea of what was going to happen in the foundry. In making up the

Costs in a Jobbing Foundry

estimates they first of all established the weight of the casting. They knew what the losses in melting usually were, and they then tried to establish what was going to be the weight of the runners and risers, and added the loss which they got each time to cover this. They calculated the amount of material cost in addition to weight of the casting made.

Overheads on a Time Basis

MR. A. J. SHORE emphasised the importance of ensuring that they did not lose money, and said that he took it that the general overhead charge was the sort of balance that was used in case a mistake had been made in the estimate. The lecturer had stated that an accurate record of the time a man actually took on a particular job was kept by the under-foreman. He (Mr. Shore) would like to know whether the under-foreman was in possession of the estimated time for the job. Cost ratio was a wonderful weapon for finding out what people were doing. They were sometimes credited with second sight if they had a cost ratio which somebody did not know about. Mr. Holladay had mentioned expressing the overheads mostly on a time basis. He (the speaker) thought that probably most of them had come to the conclusion that that was most satisfactory for the majority of overheads. Some time ago he operated under a system where the overheads were based on weight. He could not make out why, on a certain set of moulding machines, prices were so expensive. He consulted the cost office officials and found that they were working some part of the overheads on a weight basis.

Price per cwt. Basis Obsolete

MR. HOLLADAY informed Mr. Shore that, at the same time as the job cards were distributed to the men, they gave them the estimated time, which they expected them to try to improve on. As to checking percentages and overheads, they had what he regarded as quite a good system whereby, every month, he saw the total expenditure on all the various items making up the overheads. In addition, every three months he received a trial trading account which, while it was not absolutely dead accurate in that they did not take physical stock, very quickly told him if a lot of money was being spent on some particular item. With regard to a price per cwt. basis, he thought that, after the war, they would quite definitely decline to quote any prices per cwt.

In reply to a question as to how his system, which was not quite accurate, would fare in contrast with a larger firm having a more accurate costing system, the lecturer thought that with a more exact system they might lose on the swings what they gained on the roundabouts. He did not think the system was sufficiently inaccurate to be much out in comparison with a dead accurate system, because he did not believe there was such a system.

(*Continued at foot of next column.*)

NEW PATENTS

The following list of Patent Specifications accepted has been taken from the "Official Journal (Patents)." Printed copies of the full Specifications are obtainable from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1s. each.

567,510 CLAYTON DEWANDRE COMPANY, LIMITED, and RODWAY, J. Air compressing systems or apparatus.

567,551 MAGNESIUM ELEKTRON, LIMITED, FOX, F. A., and WILKINSON, R. G. Production of heat-treated wrought articles of magnesium base alloys.

567,581 CUMMING & COMPANY, LIMITED, W., and CAYZER, J. R. Foundry moulding machines.

567,603 ENFIELD ROLLING MILLS, LIMITED, and SYKES, J. Copper base alloys.

567,651 HAMILTON, J. B. W. Endless bucket elevators or conveyors.

567,662 HEAD, WRIGHTSON & COMPANY, LIMITED, WRIGHTSON, SIR T. G., and LAKE, N. C. Bar-drawing machines.

567,665 JAKOSKY, J. J. Apparatus for making rivets.

567,699 ROBIETTE, A. G. E. Method of and apparatus for the manufacture of ingots.

567,780 BARROW HEMATITE STEEL COMPANY, LIMITED, HAMILTON, W. B., and KILLINGBECK, W. Manufacture of carbides.

567,794 BLOOM, M. C. Baths for the electrodepositing of antimony.

567,829 DYSON, LIMITED, J. & J., BETHEL, H. A., and BROOKS, S. H. Bottom casting of steel ingots.

567,906 FUERY, G. T. (Diescher Tube Mills, Inc.). Cross-rolling mills.

567,925 UNITED STEEL COMPANIES, LIMITED, JAMES, W. L., and MASON, B. G. Rail joints.

(*Continued from previous column.*)

Mr. Holladay was asked how he could arrive at costs if no individual details were available for trimming and core-making. Replying, he said their core-making time was recorded as part of the productive time. They had definitely decided that fettling time should not be recorded separately, because the records they got were usually inaccurate and required too much work to get them into any kind of accurate shape.

Cupola Losses

On the subject of time work or piece-work, the lecturer said that in jobbing work, such as they were engaged on, the timing of every single job would be a difficult task to do accurately and fairly to both parties. He preferred a policy which assumed that, if a man did an honest day's work, that was what they employed him for and expected of him. Dealing with the question of melting loss, Mr. Holladay claimed that, by his system, the figures included the amount lost when the metal went through the cupola. They were not arrived at from the weight of castings made after leaving the cupola, but were taken before the metal went into the cupola, thereby accounting for losses in the cupola.

THE TECHNICAL PRESS

ITS SERVICE TO INDUSTRY AND A PLEA FOR EARLY REMOVAL OF WARTIME HARDSHIPS

A memorandum setting out the function of technical and trade journals in relation to industry at home and abroad, the difficulties with which publishers are contending, the urgent necessity for the immediate removal of such difficulties, and the manner in which this can be achieved, has been issued by the Council of the Trade and Technical Press (Imperial House, Kingsway, London, W.C.2), which represents more than 200 trade and technical journals, covering every branch of industry in Great Britain.

The memorandum points out that the technical press and the trade press are alike in the fact that both are essential to industry. They differ in the stages of industry to which they are related, the technical press dealing with production and the trade press with the later problems of distribution. Technical and trade journals are bought by their readers in the course of and for the purposes of their profession, trade or business, and as indispensable factors in its successful conduct. Such publications collectively represent a great force, actual and potential, in the industrial life of the community. The present memorandum has as its *raison d'être* a strong feeling of doubt as to whether official circles fully appreciate the collective importance of the technical and trade press, or the consequences that must flow from such lack of appreciation. It deals first with the technical press, in its relation to trade generally, and to export trade in particular. It deals secondly, in similar fashion, with the trade press. It deals thirdly with journals, whether technical or trade, published solely for export. Finally, it indicates the handicaps under which the technical and trade press labours, and the essential steps to be taken for the removal of these handicaps. The following extracts apply mainly to the technical press.

Function of Technical Journals

Technical journals deal with scientific progress and improvements in design, materials, equipment and production methods the world over. They cover the whole field of information required by manufacturers, by their suppliers, and by those whom they supply. The leading technical journals have grown in stature, step by step with the progress of industries from their earliest days, not merely recording progress but pointing the way ahead. They must be accurate to a point of precision because their task is to educate the less knowledgeable and at the same time to inform the expert.

Because of the limited number of people interested in its subject matter, the circulation of a highly technical journal may appear quantitatively small. Yet each copy may be read by five, ten or more executives in a single works before being filed for future and frequent reference. It is at the same time qualitatively vital because not a single one of its readers can afford to be without the information which it contains, or to obtain such information from any but the most reliable source. It represents the best, quickest, most regular and most economical medium for conveying this information to them.

For the manufacturer the established technical journal is at least as important in the conduct of his business as the machine tools which he instals. It may, indeed, be of prior importance in that it provides an authoritative and independent guide to the selection of such equipment and of materials, based on collective experience of their performance and use.

Technical Journals and the Export Trade

Important as must be the part played by technical journals in the re-establishment of industry in this country, their part in the fight for export trade will be of equal if not of greater importance. All technical journals of standing are carefully scrutinised abroad as at home by those who require for the purpose of their trade and business the information contained both in the editorial and advertisement pages. To the reader abroad engaged in the industry with which any given journal deals, such a journal mirrors the whole progress in this country of scientific research and developments in production methods. By such a journal the potential buyer judges whether Great Britain is the best market to satisfy his requirements. Quality of production and presentation was and will be again of primary importance to technical journals as the overseas reader tends in the first instance to judge the quality of the goods by the quality of the journal in which they are described.

To-day the technical and trade press finds itself in an unenviable position. Cut to the bone as regards quantity of paper it has for upwards of three years been carrying on with a basic ration of approximately one-fifth of pre-war consumption. Nor as far as paper is concerned does quantity present the only problem. Quality has deteriorated very seriously, and at the same time publishers have been compelled, in order to maintain anything approaching adequate circulation, to employ inferior paper of much lighter weight and giving a smaller page size than would have been used by choice.

The consequent adverse effects can only be fully realised by a comparison between present and pre-war issues. The contrast is, perhaps, even more striking between present-day publications in this country and those of similar status in the U.S.A., a number of which have grown substantially in size during the war, are widely distributed, and constitute a definite threat to pre-war established British export industries.

The technical press, the memorandum points out, requires among other things from the Government additional paper of a quality which will stand comparison with that used, for example, by competitive journals abroad; the early release of skilled operatives for the manufacture of high grade paper, for printing, and in particular for block-making; the early release of experienced technical and trade key men to supplement editorial staffs, and the release of full information on the many new discoveries and inventions that British scientific research has evolved and British skill developed during the war.

INSTITUTE ELECTS NEW MEMBERS

At a meeting of the council of the Institute of British Foundrymen, held at the Midland Hotel, Manchester, on April 21, the following were elected to the various grades of membership.

FIRST LIST

As Subscribing Firm Members

Cia. Industrial De Electricidad, S.A., Canning 3711, Buenos Aires, Argentina, S.A., manufacturers of castings; Sagar Richards, Limited, Woodbottom Works, Luddendenfoot, Halifax, diecasters (non-ferrous), (representative: C. R. Norwood, M.I.A.E., M.I.P.E.); Sarginson Bros., Station Road, Hinckley, Leics., patternmakers (representative: R. H. Sarginson); Willey & Company, Limited, Haven Road, Exeter, gas engineer and ironfounders (representative: F. Woodall).

As Members

J. Bernstein, A.R.I.C., A.C.T.C., research metallurgist, B.C.I.R.A.; E. Beven, Assoc.Met. (Sheffield), metallurgist, Bristol Tramways & Carriage Company, Bristol; H. Burnett, engineer, Broom & Wade, Limited, High Wycombe; W. Burnett, foundry foreman, J. Taylor & Company, Loughborough; F. L. Feasey, production manager, Benham & Sons, Limited, Catford, S.E.6; W. Field, foreman moulder, Crabtree Foundry Company, Leeds; W. W. C. Gee, A.M.I.Mech.E., A.M.I.P.E., works manager, United Aluminium Foundries, Limited; L. G. Giles, chief chemist and metallurgist, J. Harper & Company, Willenhall; W. H. L. Harrison, works manager, Vowles Bros., West Bromwich; W. Jackson, foundry foreman, Garton & King, Limited, Exeter; W. J. King, works manager, G.B.B. Foundry, Limited, London, N.10; F. Kilburn, metallurgist, Nelson Laboratories, Bolton; J. Lumsden, B.Sc., F.G.S., geologist, Ministry of Supply; R. E. Nutt, commercial manager, Court Works, Limited, Madeley; J. P. Robertson, pig-iron representative, Stanton Ironworks; E. .E. Rowe, assistant works manager, J. & J. Siddons, West Bromwich; A. Smith, manager, Burn & Company, Limited, Calcutta.

Transfers from Associate Member to Member

K. H. Collinson, chief engineer, J. Sagar & Company, Limited, Halifax; H. W. Griffiths, metallurgist and chemist, English Electric Company, Bradford; C. F. B. Hippisley, technical representative, Morgan Crucible Company; E. J. R. Mitchell, chief metallurgist, Rolls-Royce, Limited, Scotland; F. Squires, foundry foreman, Norcroft Foundry, Bradford.

As Associate Members

M. H. Adamson, technical assistant, John Harper, Limited, Willenhall; L. L. Allard, chargehand moulder, Fairbairn, Lawson, Leeds; L. Bell, steel moulder, Head Wrightson, Stockton; D. J. Beswick, analytical chemist, Rolls-Royce, Limited, Scotland; A. G. Briggs, metallurgical chemist, Hepworth & Grandage, Bradford; T. Brown, branch manager, Corn Products, Limited, Bristol; L. Buckley, assistant foundry manager, Ashmore, Benson, Stockton; W. Carmichael, materials inspector, Ministry of Aircraft Production; W. Cartwright, foreman moulder, Stanton Ironworks Company; L. G. Clements, foreman, Stanton Ironworks Company; L. E. Collier, patternmaker, Bristol Aircraft Company; R. Cunningham, assistant foreman patternmaker, Carron Company; J. W. Davidson, assistant foreman, Dorman, Long & Company, Middlesbrough; G. Douglas, iron moulder, Harland & Wolff, Glasgow; S. Durrant, assistant foreman moulder, Steen & Company, Scotland; A. H. R. French, metallurgist, J. Stone & Company, Deptford; A. Geary, foreman, Stanton Ironworks Company; W. Gill, patternmaker, Hepworth & Grandage, Bradford; J. W. Grant, G.I.Mech.E., metallurgist, B.C.I.R.A.; C. A. Griffin, founder, H.M. Dockyard, Plymouth; F. R. Hancox, foundry foreman, Birmingham Aluminium Company; K. Hargreaves, iron moulder, E. Hargreaves & Company, Halifax; H. L. S. Harrison, moulder, Haywards-Tyler, Limited, Luton; K. G. Hayward, moulder, Bristol Aeroplane Company, Limited; S. Heginbotham, Assoc.M.C.T., metallurgist assistant, National Gas & Oil Engine Company, Ashton; A. Hopper, foreman patternmaker, Dorman, Long & Company, Middlesbrough; F. Jackson, development engineer, Coneygre Foundry, Tipton; H. Kirk, production engineer, M. W. Woods, Limited, Colchester; G. W. Lee, foundry manager, T. Firth & John Brown, Sheffield; H. Lewis, foreman coremaker, S. Osborn & Company, Limited, Sheffield; D. J. Menzies, assistant foundry foreman, A.I.O.C., Limited, Persia; W. Meldrum, moulder, Carron Company; H. Morrogh, research metallurgist, B.C.I.R.A.; K. MacDonald, patternmaker, Whyte & Edwards, Dundee; D. McKenzie, patternmoulder, Ideal Boilers & Radiators, Hull; D. G. Offord, assistant metallurgist, Ransomes & Rapier, Ipswich; P. V. Palmer, metallurgist, C.V.A., Hove; J. Pilkington, assistant foundry manager, Blackett, Hutton & Company, Guisborough; G. H. Pottle, foreman, D. & P. Studios, Denham; A. H. Rathbone, supervisor, Rolls-Royce, Limited; H. R. Ray, foundry foreman, Broom & Wade, Limited; A. E. Redgate, superintendent, J. Stone & Company, Limited, Deptford; D. F. W. Rogers (Miss), foundry manager, Parlanti's Art Foundry, London; W. W. Rollitt, foundry foreman, Worthington-Simpson, Newark; B. K. Rowe, journeyman, H.M. Dockyard, Plymouth; J. E. Scott, commercial assistant, English Steel Corporation, Sheffield; Shearer, G., foreman moulder, Carron & Company; J. A. Shepherd, foreman moulder, Dorman, Long, Middlesbrough; A. M. Shirley, metallurgist, W. MacFarlane & Company, Glasgow; G. P. Smith, metallurgical chemist, Hepworth & Grandage, Bradford; W. A. Stevenson, assistant foreman, Anglo-Iranian Oil Company, Persia; J. R. Thomas, moulder, Birmingham Aluminium Castings; J. W. Thornton, assistant foreman moulder, S. Osborn & Company, Sheffield; M. Varley, metallurgical chemist, Hepworth & Grandage, Bradford; T. C. Watt, assistant foundry manager, Miller & Company, Edinburgh; T. Whitchurch, foundry foreman, Tees-side Bridge & Engineering, Middlesbrough; S. J. Williams, assistant metallurgist, International Alloys, Slough; T. A. Williams, foundry foreman,

Birmingham Aluminium Castings; D. Winters, draughtsman, Rolls-Royce, Limited, Derby; A. Worsnop, patternmaker, Hepworth & Grandage, Limited, Bradford; E. R. Wyatt, assistant foreman, Stothert & Pitt, Bath.

Transfer from Associate to Associate Member

W. R. Allen, designer, Birmingham Aluminium Castings.

As Associates

P. Crapnell, metallurgical chemist, Crane, Limited; A. H. Dolman, metallurgical chemist, Crane, Limited; J. B. Jesson, foundry foreman, Birmid Industries, Limited; G. J. Sharpe, patternmaker, Davis Gas Stove Company, Luton.

As Associate (Students)

P. J. Browne, apprentice patternmaker, Qualcast, Limited; P. R. Paxton, laboratory assistant, Qualcast, Limited; R. D. Swain, engineering apprentice, Matthew Swain, Limited, Manchester; H. Taylor, engineering apprentice, Leyland Motors, Limited.

SECOND LIST

As Subscribing Firm Member

Heaton Foundry Company, Limited, founders and engineers (representative: G. Pollock).

As Members

J. Barnes, acting manager, W. Jacks & Company, Limited, Liverpool; G. Burrow, metallurgist, South African Mint; J. James, metallurgist, Vickers Armstrong, Limited, Barrow; R. Jayaram, B.Sc., supervisor, Hindustan Aircraft, Limited, Bangalore, India.

As Associate Members

J. Bailey, steel moulder, Manchester; J. H. Clarke, analytical chemist, Consett Iron Company, Limited, Durham; A. J. van Eden, patternmaker, H.M. Dockyard, Cape; W. B. Greenfield, estimator draughtsman, Jarrow Metal Industries, Limited; N. Hughes, steel moulder, Jarrow Metal Industries, Limited; F. H. Lindsey, patternmaker, Jarrow Metal Industries, Limited; R. T. Ratcliffe, metallurgist apprentice, Walmsleys, Limited; Bury; L. Silverlock, iron and brass moulder, Gearings, Limited, Capetown; C. J. Syborn, moulder, H.M. Dockyard, Cape; G. Turnbull, assistant works metallurgist, Consett Iron Company, Durham; F. Turner, assistant works metallurgist, Consett Iron Company, Durham; K. N. Uberoi, foundry foreman instructor, School of Military Engineering, Lahore, India.

As Associates

J. Colwell, coremaker, Consett Iron Company, Durham; W. R. Robinson, moulder, Consett Iron Company, Durham; J. H. Stirk, apprentice moulder, Crookhall Foundry, Newcastle.

As Associate (Student)

E. Bramble, apprentice metallurgical chemist, C. A. Parsons & Company, Newcastle.

THIRD LIST

As Subscribing Firm Member

Guest, Keen & Nettlefolds, Limited, Cwmbran Works, Cwmbran, Mon, ironfounders.

As Members

L. J. Duddridge, assistant metallurgist, Northern Aluminium Company, Limited; W. E. Pettican, assistant foreman, Northern Aluminium Company, Limited; N. Ross, managing director, Ross & Company (Foundry), Limited, Sheffield; D. P. Smith, metallurgist, Aeroplane & Motor Aluminium Castings, Limited, Birmingham.

As Associate Member

A. J. Ferguson, technical representative, Morgan Crucible Company, Limited, Cardiff.

NEW TRADE MARKS

The following applications to register trade marks appear in the "Trade Marks Journal":—

"CURAFRAC" — Furnaces. C.U.R.A. PATENTS, LIMITED, 9, Rickett Street, Fulham, London, S.W.6.

"TRAVELEX"—Cooking and heating stoves, etc. JOHN MILLER ANDERSON, 34, Gartcows Road, Falkirk, Scotland.

"VERTEX"—Textile machinery. B. TOONE (NOTTINGHAM), LIMITED, Premier Works, Newdigate Street, Nottingham.

"DEVILSTAIL"—Hobs, hot plates, and firegrate fittings. BERTRAM MAURICE JAGER, 65, Paul Street, Liverpool, 3.

"SPEETOL"—Machine tools, etc. SPEED TOOLS, LIMITED, 10-16, Rathbone Street, Oxford Street, London, W.1.

"MONARCH"—Machines for breaking stone, etc. FREDERICK PARKER, LIMITED, Catherine Street (Extension), Leicester.

"FABEX"—Pipe joints, pipe clips, and tubing. F. G. BURGIN & COMPANY, LIMITED, 22, Whittall Street, Birmingham, 4.

"ALUMILITE"—Partly wrought aluminium and alloys. ALUMILITE & ALZAK, LIMITED, 40, Brook Street, London, W.1.

"POLYTRODE"—Welding machines. INTERNATIONAL WELDING COMPANY, LIMITED, 2, South Parade, Bedford Park, London, W.4.

"FIBAC" AND "AEROCAST" — Machinery and machine tools. BRISTOL AEROPLANE COMPANY, LIMITED, Filton House, Gloucester Road, Bristol.

"HILO"—Cisterns and flushing apparatus for water closets, etc. SHIRES & COMPANY (LONDON), LIMITED, Normans Buildings, Central Street, London, E.C.1.

"PROMALIZING"—Chemical compounds for use in the treatment of metal surfaces. PROTECTIVE METAL FINISHES, LIMITED, 1, Chalcot Square, London, N.W.1.

"CARBONEUTRAL"—Chemical substances used in the hardening of high-speed steel. IMPERIAL CHEMICAL INDUSTRIES, LIMITED, Wexham Road, Slough, Bucks.

"BITENE"—Chemical products obtained from bitumen, for industrial purposes. HUGH FRANCIS SPIEL, 83, Broadwalk Court, Palace Gardens Terrace, London, W.8.

NEWS IN BRIEF

NO TRACES OF BORON have yet been found in alloy steel of captured German equipment, even with most accurate spectroscopic examination.

ACCORDING TO the U.S. War Production Board, total stocks of tin have been reduced to under 7,000 tons, the lowest level since the U.S.A. entered the war.

ALLOCATIONS OF 15,000 tons of American tinplate and 15,000 to 20,000 tons of blackplate are reported to have been made to France covering the first six months of this year.

AN EXTRAORDINARY GENERAL MEETING of Stothert & Pitt, Limited, will be held at Bath on June 5 to consider a resolution increasing the capital of the company to £500,000 by the creation of 150,000 new shares of £1 each.

THE BRITISH GOVERNMENT, during the first quarter of the current year, made available to the United States under reverse Lend/Lease 30,000 tons of Rhodesian copper, and has agreed to supply another 42,000 tons during the second quarter.

THE TREASURY have made the Purchase Tax (Suspension of Registration Limit) Order, 1945, the effect of which is to abolish the present exemption from registration and tax of small manufacturers and others whose sales of goods liable to purchase tax do not exceed £500 a year.

THE PORT ELIZABETH CITY COUNCIL has accepted the tender of Dorman, Long (Africa), Limited, for the construction of a bridge across the mouth of the Gamtoos River. Some 840 ft. long, this will be the Union's first large suspension bridge and the central span, measuring 418 ft. between the piers, will be the longest in the Union.

AS PREVIOUSLY STATED, the Association Technique de Fonderie is to hold a congress in October next. It has now been decided to have the meeting at the Maison de la Fonderie, 66, rue Boissière, Paris XVI, on October 19 and 20. Two sessions will be held each day. The Institute of British Foundrymen will, it is expected, be represented by the president, Mr. John W. Gardom, and Mr. V. C. Faulkner, past-president.

SIR SAMUEL ROBERTS, BT., presiding at the annual meeting of Newton, Chambers & Company, Limited, said that the 150th anniversary of the founding of the company in 1793 by George Newton and Thomas Chambers could not, owing to the war, be observed as it should have been, but they were hoping to commemorate the inauguration (in 1795) of foundry production at Thorncliffe by a pageant at the City Hall, Sheffield, during the second week of July.

CONTROL OF WOMEN WORKERS, aged 45 and over, and of most men of 50 and over, is finished, the Ministry of Labour announces. These are the first releases from direction to war work by the Ministry. More can be expected now that the war with Germany has ended. Relaxation of the control means that men and women in the high age groups can leave their jobs whenever they like. The only proviso is that covering men over 50 who have special skill or experience, and who are on work of the highest priority. They may not be released.

BRITISH ENGINEERS' SMALL TOOLS & EQUIPMENT COMPANY has been formed by a group of precision engineering companies to develop export sales of its member firms. The constituent members are Brooke Tool Manufacturing Company, Limited, Coventry Gauge & Tool Company, Limited, A. A. Jones & Shipman, Limited, F. Pratt & Company, Limited, Taylor, Taylor & Hobson, Limited, and E. R. Watts & Son, Limited, who will provide the new company's finances. Office accommodation has been taken at Buckingham House, Adelphi, London, W.C.

THE MINISTRY OF SUPPLY announces the formation of a Panel of Technical Advisors to assist the Director-General of Machine Tools on special technical problems associated with particular types of machines. The members of the Panel are: Mr. H. W. Smith (B.S.A. Tools), Mr. G. W. Nash (Buck & Hickman), Mr. J. G. Petter (Cincinnati Milling Machines), Mr. H. T. Millar (Churchill Machine Tool Company), and Mr. H. A. Chambers (Associated British Machine Tool Makers). They will serve in their personal capacity, either individually or jointly as necessary.

IN AN ADDRESS at Wolverhampton Production Exchange on "The Present and Future of Ironfounding," Dr. J. G. Pearce, director of the British Cast Iron Research Association, said the iron and steel industry in South Staffordshire had known many changes. No country in the world had any technical superiority over this country in the art and science of founding. The post-war ironfounder could be aggressive and enterprising in his manufacturing, selling, research and development policies in the confident knowledge that he was not selling something because it was cheap, but because, for certain purposes, it was indispensable.

LORD SEMPILL, speaking at a luncheon of the Scientific Instrument Manufacturers' Association of Great Britain, said that an immense opportunity lay before the British scientific instrument industry, but a far greater measure of vigorous co-operation must be given by the Government. The industry to-day had an output of £30,000,000 and employed between 50,000 and 60,000 hands, and there was no reason why there should be any falling-off in the value of the output. We must recapture the position we once held and supply to the world a very large share of the equipment which came from Germany during the last 60 years.

PRESIDING at the annual meeting of the Millom & Askam Hematite Iron Company, Limited, Sir Andrew Lewis, the chairman, said that they had in recent years been carrying out a boring programme in the search for a new iron-ore field, but had not found ore in sufficient quantity to justify shaft sinking. While prospecting in the Mockerkin area they found traces of coal, and two boreholes found a seam of 4 ft. 6 in. at 600 ft. A third borehole had not touched coal, and, though they were continuing to bore, there was not sufficient information available to decide whether the area would prove a commercial proposition.

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THE STANTON IRONWORKS COMPANY
LIMITED
NEAR NOTTINGHAM

COMPANY RESULTS

(Figures for previous year in brackets.)

Mason & Barry—Profit, after depreciation, £18,299 (£13,718); dividend of 7½% (5%).

Range Boilers—Net profit for 1944, £12,486 (£12,904); dividend of 20% (same).

Hopkinsons—Net profit, £89,498 (£74,043); final ordinary dividend of 15% (12½%), making 20% (17½%).

Atlas Steel Foundry & Engineering Company—Interim ordinary dividend of 3s. per share, equal to 15% (same).

Glenfield & Kennedy—Net profit, £59,684 (£60,871); final dividend of 5% and a bonus of 10%, making 20% (same).

Warne, Wright & Rowland—Profit for 1944, including income from investments, after depreciation, £18,712 (£18,203); dividend of 25% (same).

Peglers—Profit to March 31 last, after E.P.T., £99,241 (£94,394); dividend on the "A" and "B" ordinary shares of 1s. 4d. per share of 5s. (1s. 2d.).

Rio Tinto—Net returns on sales of produce, etc., for 1944, £277,724 (£288,465); dividends, etc., £163,301 (£220,841); balance, after expenses, taxes, debenture interest, etc., £167,781 (£192,560); debenture redemption, £113,076 (£107,627); forward, after preference dividend, £537,807 (£564,352).

Robey & Company—Trading profit for 1944, £87,786 (£86,342); balance, after providing for depreciation and other charges, £78,850; taxation, £47,500; debenture interest and sinking fund, £2,400; dividend on the 5% non-cumulative preference shares, £3,017; 10% dividend on the ordinary shares, £7,811; to general reserve, £15,000; forward, £24,160.

Projectile & Engineering—Profit for 1944, after £40,000 for depreciation and £10,000 for deferred repairs, £88,459 (£118,098); provision for taxation no longer required, £87,046; interim dividend of 7½%, less tax, £11,250; reserves and provisions, £99,046; staff pension fund, £1,000; taxation, £48,772; final dividend of 12½%, £18,750; forward, £49,454 (£52,767).

Colvilles—Trading profit and other income for 1944, after providing for taxation, war damage insurance and contingencies, £537,199 (£538,969); net dividends from subsidiary companies, £94,212 (£109,438); depreciation and obsolescence, £350,000 (same); dividend on the 5½% cumulative preference stock, £55,000; ordinary dividend of 8% (same); forward, £320,217 (£252,088).

Imperial Chemical Industries—Net income for 1944, after taxation and £2,500,000 for central obsolescence and depreciation, £6,972,988 (£6,685,245); war contingencies, £172,145 (£774,210); preference dividend, £1,685,438 (£1,682,468); ordinary dividend of 8%, £4,032,149 (same); special appropriation for obsolescence and depreciation, £1,000,000; forward, £1,145,274 (£1,062,018).

John Thompson Engineering—Trading profit for 1944, £12,650 (£49,392); deferred repairs, £4,000 (nil); investment income, £5,713 (£6,049); dividends from subsidiaries, £70,663 (same); E.P.T. relief, less tax and N.D.C. provision, £36,000 (£8,947); depreciation, £9,422 (£10,159); staff pensions, £3,242 (£6,674); to investments deficiency, £613 (£579); preference dividend, £11,849 (£11,778); ordinary dividend of 17½% and bonus of 5%, £50,798 (same); to general reserve, £35,000 (£30,000); dividend reserve, £15,000 (same); employees' pensions, nil (£5,000); forward, £57,302 (£55,350).

COST OF WORKMEN'S COMPENSATION

The premium income of the Iron Trades Employers' Insurance Association, Limited, in 1944, amounted to £3,870,860, an increase of £71,622 over the corresponding figure for last year. It is recommended that a premium return for the year 1944 be authorised at the rate of 25 per cent. of the Workmen's Compensation premiums.

The chairman, Mr. F. C. Pyman, in his annual statement to members, says that the tendency for accidents to reduce in number continues, the total reported for 1944 being 82,514, a reduction of 13.8 per cent. on those reported in 1943. On the other hand, the cost of claims continues to rise—indeed, the cost per claim has risen by 50 per cent. since the war began. The reasons are not far to seek. They are, first, the substantial increases in the rates of compensation awarded under recent legislation and, secondly, the growing extent to which employees injured in industry are claiming for damages at common law when it is alleged that there has been a statutory breach or negligence on the part of the employer.

PERSONAL

MR. H. M. SUTHERLAND has been appointed an employee director of Davy & United Engineering Company, Limited.

MR. K. M. JONES, MR. A. O. MORGAN and MR. L. D. WILLIAMS have been appointed directors of the Briton Ferry Steel Company, Limited.

MR. W. D. KNAGG, lately assistant foundry manager to Rolls-Royce, Limited, Derby, has been appointed foundry manager of Herbert Morris, Limited, Loughborough.

MR. W. N. LINDLEY, chairman of the British Piston Ring Company, Limited, has resigned for health reasons. MR. A. H. JARRARD, who was appointed an additional director in March last, has been appointed chairman.

MR. JOHN LUCAS, foundry and patternshop manager of Herbert Morris, Limited, Loughborough, has retired after nearly 45 years' service. He is a past-president of the East Midlands Branch of the Institute of British Foundrymen.

THE NOMINAL CAPITAL of Capper Pass & Son, Limited, metal smelters and refiners, of Bristol, has been increased by £100,000 to £653,000.

Design by Victor Reinganum

MOSAICS OF STEEL

NUMBER THREE

The Steel, Peech and Tozer plant at Templeboro is for size unequalled in the country, and its products serve an unlimited number of industries. The large scale continuous rolling plants were the first of their kind installed in Britain and they are constantly being brought up-to-date to cater for the progressive needs of steel users. The products are supplied for further rolling, forging, stamping and other kindred processes to supply the components of a host of dependent industries. Some of the output of the Templeboro plant is taken by associated and adjacent plants for rolling into bar and strip. These rolled products find their way by many channels of manufacture into the engineering and hardware trades as component parts of mechanical, electrical, transport equipment and domestic utility. At the Ickles works, steel is made for processing in the heavy forging plant. Steel, Peech and Tozer are world famous for the quality of their railway products—tyres, wheels, axles and springs.

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SAMUEL FOX & CO. LTD., SHEFFIELD
UNITED STRIP & BAR MILLS, SHEFFIELD

APPLEBY-FRODINGHAM STEEL CO. LTD., SCUNTHORPE
WORKINGTON IRON & STEEL CO., WORKINGTON
UNITED COKE & CHEMICALS CO. LTD., CUMBERLAND

THE ROTHERVALE COLLIERIES, TREETON
THE SHEFFIELD COAL CO. LTD., TREETON
THOS. BUTLIN & CO., WELLINGBOROUGH

USP.47

NEW COMPANIES

("Limited" is understood. Figures indicate capital. Names are of directors unless otherwise stated. Information compiled by Jordan & Sons, 116, Chancery Lane, London, W.C.2.)

Osda Welding Company, 46, Canal Street, Nottingham—£1,000. A. and H. M. Wheeldon.

Tyneside Metal Spinning Company, 3, West Street, Gateshead—£1,000. F. and M. B. White.

Express Sheet Metal Company, 2, Gill Street, London, E.14—£1,000. E. E. and E. T. Crockett.

Lawford Iron Works, Manningtree, Essex—£4,000. J. R. M., C. J., and J. A. Fitch, and W. Nunn.

Beuchet Engineering Company, Canal Yard, Hayes Road, Southall, Mdx—£2,000. L. A. and E. A. Redgwell.

L. & J. Thomas (Engineers), 10a, High Street, South Norwood, London, S.E.25—£2,000. J. G., L. J., J. A., and E. Thomas.

George Fletcher (Brassfounders), Guildford Chambers, 111, Headrow, Leeds, 1—£2,000. G. W. and M. L. Fletcher.

Richardson & Tyson, Kirby House, Little Park Street, Coventry—Engineers, welders, etc. £5,000. E. Tyson and J. R. Richardson.

Walker & Bennett (1945), Chesham Works, Chesham Street, Bradford—Spring makers, engineers, etc. £5,000. W. J., J. W., and A. W. Lupton.

F. H. Burgess (Gloucester), Green Bridge Works, Stafford—Agricultural and general implement dealers, etc. £10,000. H. F. and W. D. Burgess.

Hayes (Heating & Domestic Engineers), 91, Eccles Road, Lavender Hill, London, S.W.—£500. R. A. Hayes, A. F. Smith, and J. A. Waghorn.

C. Taylor & Sons (Cheltenham)—Motor, marine, mechanical and general engineers. £10,000. F. E. and C. A. Taylor, 32, Kings Road, Cheltenham.

Farmfitters, Kingshill Works, Great Missenden—Agricultural, civil, mechanical and electrical engineers. £2,000. J. H. C. Beard and R. O. Bennett.

N. H. Engineering—To take over a section of the business carried on by G. N. Haden & Sons at Trowbridge. £80,000. K. A. Collyer, subscriber.

Birkenhead Electric & Acetylene Welding Company, 117, St. Paul's Road, Birkenhead—£500. D. J. Templeton, G. A. Stewart, and A. J. Scullion.

Thomas Lloyd, West End Mills, Leopold Street, Long Eaton, Notts—Precision engineers. £2,500. E. T. C. and M. M. Lloyd and J. M. Shipstone.

Canavin Partners, The Portway, Avonmouth, Bristol—Manufacturers of agricultural and other machinery. £2,000. W. J. Ellis and R. Howell.

Milex-Star Engineering Company, 7, New Court, Lincoln's Inn, London, W.C.2—To take over a business carried on as "Victory Precision Engineers." £100.

C. Jones & Company (Clyn Works), 1191, Stratford Road, Birmingham, 28—Manufacturers of ferrous and non-ferrous articles. £1,000. C. H. Jones and F. J. Lofley.

Precision Seeders, Elms Lane Nurseries, West Wittering, Chichester—Manufacturers of agricultural and horticultural implements, etc. £1,000. C. F. Barrow

Birmingham Electric Furnaces, Grosvenor House, Park Lane, London, W.1—£100. D. O. Evans, Pigeonsford, Llangranog, Llandyssul, Cardigan, delegate director.

Ferrocraft, 93-94, Hatton Garden, London, E.C.1—Manufacturers of wrought-iron furniture and fittings, etc. £5,000. W. Levison, H. W. Littleales, T. R. and C. T. R. Roberts.

Donington Products, Granite House, 101, Cannon Street, London, E.C.4—Manufacturers of metals and metallic combinations. £5,000. Sir R. Rhys-Williams and F. A. Hurst, senr.

W. D. Beaumont (Metal Section), Royal London House, 17, Finsbury Square, London, E.C.2—£600. W. D. Beaumont, W. H. May, R. C. Hart, E. H., W. W. and F. E. Petty.

Clayton & Gott (Manchester), Marsland Chambers, 1, Marsland Road, Sale, Ches—Manufacturers of textile and general machinery, etc. £100. T. C. Clayton, N. and T. W. Gott.

Hoffmann Tweedales—Manufacturers of ball bearings, roller bearings, tools, etc. £400,000. A. F. Armitage, J. W. Garton, J. L. Hilton, F. R. W. Preston, E. Smalley, and W. A. Walsh.

W. P. Eglin, Globe Works, Sowerby Bridge, Yorks—Manufacturers of fenders, fire irons, bedsteads and general hardware. £15,000. F. Cresswell, F. Brayshaw, P. Oldfield, and H. Thornber.

Alumasc—Manufacturers of and dealers in aluminium, duralumin and other metal ware, etc. £1,000. Adjustable Nominees, Limited, 88, Leadenhall Street, London, E.C., subscribers.

Dawe Instruments, 1, Lincolns Inn Fields, London, W.C.2—Manufacturers of engineering and scientific and other instruments, etc. £5,000. F. W. Dawe, C. J. Sanders, E. C. Kent, and R. T. Nutter.

A. Watson Adams, 74, Arundel Avenue, East Ewell, Surrey—To take over a business of engineers, etc., carried on by A. W. Adams at Skegness. £1,000. A. Watson Adams, W. J. Gotz, and A. F. Smith.

Henry Simon & Turners, 86, Strand, London, W.C.2—To export, sell and supply for use outside the British Isles milling machinery and accessories made or dealt in by Henry Simon, Limited, and E. R. & F. Turner, Limited, etc. £100. Sir E. D. Simon, J. F. Lockwood, G. M. Anderson, P. G. Hamilton, A. Leggett, P. N. Savoy, A. H. Leggett, and P. A. Leggett.

OBITUARY

MR. H. L. CHARBONNEL, governing director of L. Charbonnel, Limited, iron and steel merchants, died at Leatherhead, recently.

MR. ROBERT ALLAN, a partner in the firm of Logan & Allan, iron, steel and metal merchants, of Glasgow, died suddenly on May 9. He was well known in the scrap trade in Scotland.

MR. JOHN EDMUND BRITTAIN, of Chesterton, North Staffs, died recently at the age of 82. Until his retirement three years ago he was proprietor of J. Brittain & Son, Hope Foundry, Chesterton.

UNINTERRUPTED service and minimum maintenance costs are assured by the use of firebricks selected to meet the operational requirements of particular furnaces. The GLENBOIG sales staff are at the service of users of firebricks to assist them in the selection of materials.

GLENBOIG

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86

Raw Material Markets

IRON AND STEEL

Blast-furnacemen are still steadily disposing of their permitted outputs, which can only be increased when bigger tonnages of raw material are placed at their disposal. Provision of the extra fuel is probably the most serious obstacle to be overcome before additional blast furnaces can be re-lighted. On the other hand, it is hoped that more imported iron ore will be available as soon as shipping space can be provided. Sweden, in particular, having substantial tonnages for disposal. Transport is, of course, a bottle-neck, but if this can be provided a welcome improvement in the production of the better grades of pig-iron should soon be possible.

The supply of few descriptions of scrap exceeds the demand. Steelworks continue to display a keen interest in heavy steel scrap. Foundry scrap is in short supply, particularly the heavy grades. Light iron scrap is fairly freely offered.

Production of steel semis seems to be commensurate with current needs. Pressure is heaviest for sheet bars, and outputs have been stepped up to enable the sheet mills to keep pace with their heavy commitments. On the other hand, demands upon the mills rolling light sections, small bars; etc., have latterly been less insistent, and the consumption of billets, blooms and slabs has been on a slightly reduced scale.

There has been no decisive change in the finished steel trade. Shipbuilders are chiefly specifying for light plates and sheets, and comparatively small tonnages of heavy plates and sections are being rolled. Mills engaged on steel rails, colliery arches, props and bars have plenty of work in hand, but it is obvious that big changes in the steel trade are pending, and in the course of a week or two it may be possible to discern more clearly the shape of things to come.

NON-FERROUS METALS

With greater freedom to purchase, and fewer restrictions on manufacture, it may be expected that consumption of the non-ferrous metals will show a steady increase. Changing over to peacetime production, however, generally seems to be a slow process. Departmental authorities are sympathetic, and no doubt wish to be helpful, but manufacturers are still too closely enmeshed in wartime regulations and procedure. Reopening of the London Metal Exchange for dealings in futures seems to be as far off as ever. Meantime, fixed prices continue. Ample supplies of metal except tin are available.

THE ROYAL SOCIETY OF ARTS announces that Mr. Churchill has been awarded the Albert Gold Medal, its highest award.

NEW PATENTS

The following list of Patent Specifications accepted has been taken from the "Official Journal (Patents)." Printed copies of the full Specifications are obtainable from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1s. each.

567,952 BETHLEHEM STEEL COMPANY. Manufacture of steel or alloy steel in the open-hearth furnace.

567,977 FORD MOTOR COMPANY, LIMITED, and RENSHAW, E. S. Process of refining ferrous metals.

567,998 PILKINGTON BROS., LIMITED, and SHERLOCK, A. Processes for reducing iron impurities in ground calcite, dolomite, magnesite, and cryolite.

568,110 OMES, LIMITED, and ROGATI, C. Electric heating apparatus for billets and the like.

568,111 SHEFFIELD, G. H., and SHEFFIELD & COMPANY (ENGINEERS), LIMITED, G. H. Construction of bogie trucks for railway and like vehicles.

568,115 GIBBONS BROS., LIMITED, MARLE, M. VAN, and WEBB, A. W. OGILVY-. Furnaces for the heating of metals.

568,143 NEWTON & COMPANY, LIMITED, L. H., and HANDS, W. E. Cold-forging machines.

568,159 WEST'S GAS IMPROVEMENT COMPANY, LIMITED, WEST, F. J., WEST, E., and BIRD, A. G. Repair of retorts or chambers.

568,161 PEACH, A. L. Method and means for electrolytically providing metals with an improved hard-wearing surface of chromium.

568,207 MOND NICKEL COMPANY, LIMITED, and PFEIL, L. B. Treatment of metal surfaces.

568,303 PROCTOR, W. F., and WEBB, G. W. Casting of metals.

568,315 ADELINE, P. Manufacture of metals and alloys.

568,451 BRASSERT & COMPANY, LIMITED, H. A., and NISSIM, R. Electric-arc furnace having a removable hearth or roof.

568,465 WOLSINGHAM STEEL COMPANY, LIMITED, and LIDDLE, T. Manufacture of ships' rudder frames.

568,466 VICKERS-ARMSTRONGS, LIMITED, and PARKER, L. D. Rotary kilns for burning cement, ore, and similar materials.

568,491 FLEENOR, W. O. Mould for casting metals.

568,511 AKT.-GES. BROWN, BOVERI, & CIE. Removal of slag from furnaces.

THE INDUSTRIAL WELFARE SOCIETY, in issuing a new booklet, "Plan for Reinstatement," point out that the Government's publication, "Release and Resettlement," has been issued to Service men and women to inform them of the official arrangements being made for their resettlement after discharge. It is not available to civilians, but the Serviceman's resettlement will depend as much (if not more) upon the right attitude and the sympathetic co-operation of civilian employees in industry as it will upon the validity of the official schemes. The booklet sets out to show how an employer can double the value of the Reinstatement Act by carrying it out in a spirit that is sympathetic and generous-minded—not just "reasonable and practicable."